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CASE OF CHOLESTEATOMA OF FLOOR OF
THIRD VENTRICLE AND OF THE
INFUNDIBULUM.

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CLINICAL SUMMARY.—W. A. L., æt. 29. As a lad, had violent headaches which became more frequent about the eighteenth year. About this time several attacks of transient blindness. In 1876, '77 and '78, when a student, had trouble with his eyes, had headaches and would frequently fall asleep during the day. He graduated in 1879, and began practice. In June, sudden loss of power and sensation in left arm and leg, which returned in an hour. Shortly after, violent headache with vomiting. After an attack of somnolence, he had a brief maniacal outbreak. From July to October much headache, vomiting, and great drowsiness. Would sleep many hours. Pulse often as low as twenty-eight or thirty. Intervals of several days between the attacks. In October was at times incoherent, and lost all recollection of his wife and family. Sight much disturbed, and there was diplopia; one slight epileptiform convulsion. Throughout November and December great improvement, and rapid gain in flesh. For the first six months of 1880 he was able to be about, though the headaches recurred at inter-

vals, and the constant tendency to sleep persisted. Gait staggering. In March, double optic neuritis was determined by Dr. Buller. In beginning of July, another severe attack of headache and vomiting lasting three days, followed by a severe convulsion and prolonged sleep, from which he awoke quite blind. From this time rapid recovery of health, and for five years was able, though blind, to manage a drug business. On June 3d, 1885, return of attacks of headache, vomiting, and prolonged somnolence. Remained unconscious until August 27th, when he awoke at 4 A.M. quite suddenly. From this time pain in the head was the prominent symptom; no further loss of consciousness. Death suddenly, April 25th, 1886.

ANATOMICAL SUMMARY.—Cyst at base of brain in position of optic chiasm. Infundibulum greatly thickened. Small solid tumor in anterior and lower part of third ventricle. Dilatation of the lateral ventricles. Atrophy of optic nerves and tracts. Numerous pearly bodies scattered in the lining membrane of the cyst, and throughout the solid parts of the tumor.

The full account of this remarkable case is thus given by Dr. Buller of Montreal, and by the patient's brother, Dr. J. L.

The early history of the case, as related to me in a letter from the patient's brother, Dr. J. L., dated March 22d, 1880, is as follows: "My brother began to complain of his eyes about the beginning of the year 1877, and all the following summer he complained of more or less pain and uneasiness, but they did not give out until near the close of next winter. He was then in his primary year as a student of medicine, and found great difficulty in writing for his examination. His visual troubles continued to increase until about the month of May, when he went to Toronto to consult an ophthalmic surgeon, who pronounced his condition retinitis albuminurica. This diagnosis I never accepted, for it seemed unreasonable to me that he should have such advanced symptoms from a constitutional disease without having any of the physical or other symptoms of that affection.

“Notwithstanding his imperfect vision he continued his course of studies, never missing a lecture up to the time he was first seen by Dr. Buller at Christmas time, 1878. His vision had then so far improved that he was able to read without difficulty. He completed his medical studies in the spring of 1879, having enjoyed excellent health the whole winter. Immediately after obtaining his degree, he commenced the practice of his profession in a country village, and all went well until about July 20th of the same year, when he was attacked with violent frontal headache and nausea with occasional vomiting; this continued for about a fortnight, accompanied by great lassitude and inability to make any exertion. It seemed an effort for him to exist. He had made up his mind to go to Ottawa for medical advice, and while waiting for the conveyance that was to have taken him there he fell asleep for a short time, and awoke in a violent attack of delirium, with complete suppression of urine, which lasted for about twenty-four hours. A brisk purge set him right, and the next day he left for Pembroke, where he arrived at my house the same night. It should here be mentioned that he had been vomiting his food for several days before his arrival here. This was about August 22d last (1879). The second night after his arrival, the pain became very severe, accompanied by uninterrupted vomiting for about eighteen hours. For several days he had repeated attacks of pain and vomiting, now always aggravated after a long and profound sleep. During the attacks of pain, the pulse would fall in frequency to about forty or forty-five, and even to twenty-eight and thirty; the temperature was not increased. (Probably any subnormal temperature would have been noticed by the writer of this letter if it had existed, but he does not speak of it.—F. B.)

“In the intervals between the attacks of pain, his appetite would return, he would eat freely and apparently be improving. The first treatment he got some time during the first week here while suffering dreadfully. I applied six leeches and a blister, which gave immediate relief; in fact, the leeches had hardly taken when his pulse began

to rise, and in less than twelve hours he was perfectly easy.

"This condition continued with very little variation for about three weeks, when the attacks became milder and the intervals longer, but with a steady decrease of weight. I applied blisters repeatedly, always with marked benefit. I also applied a seton at the nape about the fourth week. On one occasion, about the fourth week, on attempting to stand up to pass water he was seized with a slight spasm, and I think if he had been kept in the upright position it would have developed into a convulsion, but immediately on his assuming the reclining position it passed off, which made me think it was from deranged circulation on account of his having suddenly assumed that position. About this time he complained of a loss of feeling passing all over his body; it used to alarm him very much, and he used to say, 'I cannot feel anything but my poor head.' It seemed to be a numbness lasting only for a little while; it occurred several times, sometimes all over the body, and sometimes only on one side. He never suffered from paralysis of any part or any organ with the exception of his sight. The special senses were all perfect the last time I saw him, about four weeks ago.

"About September 28th he began to show signs of mental failing, evidenced by slight loss of memory, and at times it was difficult to arouse him to perfect consciousness; he would mutter on being shaken, but you could not bring him to himself. This would continue for some hours, when he would wake up quite bright. This was his condition at intervals for the last week before I started to New York with him. The pain during this time was not very bad, and there was not much vomiting.

"He complained continually of feeling a sensation, in different parts of his body at different times, of the touch of what he called a pebble. He would describe the size of it as that of a pigeon's egg, with a rough surface. Of course he knew it was only an illusion, that it did not exist, but he had the sensation, and used to say he had a lump in his brain and that it was the size and shape of the pebble,

but the fact of his knowing the diagnosis was tumor would be a sufficient reason for him to connect the two and give rise to the idea.

“ The morning of Oct. 3d, on preparing to dress him for the journey to New York, he was very poorly and could hardly realize that we were starting; indeed, before we left the house it was impossible to make him understand anything, and after we had started I decided to take the Perth train at Smith’s Falls and return home, but before we arrived at Smith’s Falls he wakened up quite bright and remained so until we arrived in New York on Saturday morning. He kept nicely all day Saturday and also on Sunday, which was the day we saw Dr. Janeway. He was then well enough to give the doctor a history of his case, but on Sunday night he began to suffer pain again, and for the next four or five days he vomited constantly and was at times more or less unconscious, still never so profoundly so as before leaving home, but he showed a dulness of perception of what was going on around him and partial loss of facts as to days, etc. I started for home Oct. 10th, and on moving him from one train to another I had to elevate his head and shake him. Once, in doing this, he had a distinct spasm; in fact, I think it might safely be called a convulsion. He remained more or less unconscious until we arrived at his own home in Perth on Oct. 11th. From this time until the 26th he was perfectly helpless in bed and quite unable to assist himself in any way. I was not sure if he was conscious when relieving himself; he apparently would recognize any person passing before his sight, but could not connect any ideas or think; took very little nourishment and was reduced to about eighty pounds—a perfect skeleton. Exactly a fortnight from the day we left New York, he opened his eyes on Sunday morning as bright as a dollar, and began from this time to eat, sleep, and gain strength. For eight weeks he gained flesh at the rate of one pound per diem until he weighed about 150 pounds. This change took place without treatment of any kind. After he began going about, he commenced taking iodide potass. up to

almost twenty grains twice daily, but not regularly, and another seton was put in the neck.

“From this time until Christmas he remained to all appearances perfectly well, without headache, nausea, or vomiting, and in the full enjoyment of all his faculties. About Christmas time he paid me another visit in Pembroke. After he had been here a few days, the headache and vomiting returned. He remained here a short time and then returned to Perth, where he remained until he visited Montreal.”

I (Dr. Buller) saw W. L. for the first time about the end of December, 1878; he then appeared to be in good health and quite capable of carrying on his studies as a medical student. I was asked to examine his eyes in order to ascertain whether there remained any evidences of the retinitis albuminurica thought to have been discovered in the previous month of June. I could find no trace of disease of either retina or optic nerves. Vision was normal, refraction, H. $\frac{1}{30}$. I also examined the urine and found neither casts, albumin, nor sugar. The specimens examined under the microscope, however, contained numerous crystals of triple phosphates and large numbers of small octahedral crystals of oxalate of lime. At that time, he was not suffering from headache or any inconvenience from using the eyes for close work many hours daily. There was nothing in his manner or appearance to indicate a defective state of health. He next came under my notice on the 20th of March, 1880. His history during the intervening period has been given in detail in the foregoing communication from his brother. He came unattended to Montreal. The following day I noted his condition as follows:

The patient has a somewhat slow and hesitating manner of speaking; occasionally he forgets words that he should be familiar with, walks slowly, as if feeble and languid, and has a certain unsteadiness of gait which at times is almost staggering, especially on getting up after resting in a recumbent posture; at such times he feels a sort of giddiness. There is no evidence of weakness in executing

any ordinary muscular movements. The tendon reflex, however (knee jerk), is slow and weak. Complexion is rather fresh; the face has a puffy look and appears somewhat too fleshy for the body, and may best be described as a stolid heavy countenance entirely destitute of expression or animation; even when he smiles there is the same want of animation. At the same time, there is no defect in the voluntary movements of the facial muscles and no defect in cutaneous sensation. He still suffers a good deal from frontal headache, especially in the morning, and always carries the head somewhat thrown backwards. Vomited a little the morning he left home, but not since.

Four days later (March 25th) he was found to sleep most of the time, and when awake yawned very frequently. He is also much troubled with hiccough. The attendants in the hospital notice that he seems to forget to take his meals, and at times acts somewhat like a drunken man in his walk, and once or twice has almost fallen backwards when going up-stairs. In walking rather swings the legs. He attributes the uncertainty of gait to weakness—an idea that is perhaps not altogether without foundation, as the muscular power of hands tested with dynamometer only amounts to sixty pounds.

The appetite is fairly good, tongue a little furred, bowels inclined to be costive. Urine thirty-six ounces in twenty four hours, slightly acid, of a pale yellow color, deposits a little flocculent mucus, contains neither casts, albumin, nor sugar. There is no anomaly of sensation discoverable in any part of the body, and now he never feels "the lump" spoken of by his brother in the early stage of his complaint; is able to give a clear description of his past life; close questioning does not discover more than a possible venereal origin of the disease; it was, however, thought best to try the effect of iodide of potassium in full doses, commencing with twenty grains and increasing as rapidly as the stomach would bear the drug well diluted; this was commenced the second day after his arrival in Montreal. On March 26th he was examined by Dr. R. P. Howard, who gave me the following notes:

"Heart sound, normal; pulse, 65; presents no peculiarities; lungs healthy, but respiratory sounds weak; right side of chest flatter than left, and lower respiratory movements on this side markedly less excursive than on left side; shows an annoying restlessness under examination; has a papular(? iodide) rash on body and slight coryza; body emits a peculiar musty odor, which, however, is probably due to external circumstances. Is now taking iodide gr. xxx. thrice daily, preceded by a small dose of hydrocyanic acid a few moments before the iodide is administered. Still has hiccough and morning headache." The condition of the eyes was not placed on record until March 27th, but had not in any way changed since the 21st. It was as follows:

Pupils equal, in ordinary daylight about $2\frac{1}{2}$ mm. wide, act sluggishly both to light and acc., $V = \frac{2}{3}0$ and $Hm \frac{1}{8}$ each. The ophthalmoscope shows well-marked double optic neuritis—choked discs—not neuroretinitis, the swelling being little wider than the normal disc and quite steep. With hyperopia = $\frac{1}{2}8$ at macula, the surface of the nerves is best seen with + 10. Veins dark and tortuous, but of normal size; arteries a little smaller than normal; vessels only here and there hidden or obscured by the swelling of papilla; no hemorrhages, and only a moderate degree of white striation, and the papilla appears rather reddened; macula regions entirely normal. There is no contraction of the visual fields, no defect in perception of colors, and the muscular system of the eyes presents no abnormality.

He remained in Montreal until April 3d without any material change in his condition; some days feeling a little better and others suffering more from headache (always frontal), occasionally vomiting, was taking pot. iod. gr. lx. three times daily, when he returned to his home in Perth.

Oct. 21st. Came to Montreal again for the day in order to have another examination of the eyes, having now become entirely blind. Continued taking the iodide in about the same doses all summer, but for the last three weeks has omitted it. Vision failed steadily from the time he

left Montreal, but could still see fairly well about the beginning of July, when he had another severe attack of headache and vomiting which lasted some three days, and culminated in a convulsion. This was followed by a profound sleep from which he awoke entirely blind, which has continued up to the present time. Since this last severe attack his general health has steadily improved. Has had no headache to speak of since the end of August, only a little occasionally just on the top of the head; feels strong and well; walks without staggering; his countenance has gained in expression; is well nourished, and in the matter of appetite and sleep there is nothing amiss; also avers that sexual power is unimpaired. The appearance of the optic nerves has undergone a great change: both are alike extremely pale, scarcely if at all swollen, a little irregular at the margin. The veins tortuous, but both veins and arteries much diminished in size. Was next seen by me on June 24th, 1882; came on account of an acute catarrhal otitis media of the left ear, which has caused him a considerable degree of pain for the past ten days, otherwise his health has been very good since his last visit. The completely atrophic optic nerves have never afforded him a glimmer of light since the day he became blind. The ear trouble yielded readily to the usual treatment, and he returned home on June 24th.

The remainder of the history is thus given by his brother, Dr. J. L. "He recovered perfectly from the ear trouble and remained well, enjoying good health until June, 1885—making five years of relief from his trouble—when the pain reappeared, and up to the 27th of August, he suffered much as in the first illness, with severe attacks of pain, vomiting, and long spells of somnolence. During some of these attacks the pulse was very weak and fluttering, and in one it was thought that he was going to die, and I was telegraphed for. He was more or less unconscious all this time, and it is said that when the attack passed off on the 27th, the first word which he spoke was to take up the sentence he left off in June, three months before, when seized with the headache. On the 28th of August he sat

up and took his dinner at the table, and remained well, with the exception of slight attacks of pain until Nov. 15th, when he was seized with a terrible stabbing, piercing, unendurable pain in the head and his face flushed crimson. This gradually passed off, and he was able to walk to the post-office. From this time he was up and down, one day well and several days in pain, but there was very little vomiting and no disturbance of the pulse. He slept well when not suffering.

"During the last month the intervals of relief were very short, a day or two at most, and the attacks of pain longer, and for the last fortnight the pain was nearly constant; he has to have some person sitting beside him to keep him from falling asleep; if he happened to fall asleep, in a few minutes he would wake up *frantic* with the increased suffering. The Thursday before he died he was down-stairs enjoyed his meals, and he looked quite well, and likely to be so; he was always so cheerful and bright when free of pain and suffering. He passed away without any struggling or any particular warning of the approach of his death. He had peculiar attacks, the last three weeks before his death. I was at his bedside one morning, and he called me in distress and complained of a strange feeling in his head. He said his head was all drawn up, and that his face was also all drawn up, although showing no indication or appearance of any change in expression. His hands and feet were extended and rigid, but could be flexed by force. He appeared greatly alarmed and distressed, and his appeals of distress and alarm were pitiful. During the attack, which lasted half an hour, his pulse never varied or changed; it was perfectly normal. The attack lasted about half an hour; it returned again several times during the day. Another expression he used, 'My inside is all drawn up.' He used the word *drawn* to describe the sensation in his inside, face, and head. He had several attacks of this character the last two weeks before his death, and it was fearing an attack like this, and feeling it coming on, that he called his mother the night of his death: he said,

"Mother, mother, I am going to have one of those attacks; raise me up!" He then said, 'I feel like fainting, get me a glass of water!' He tried to drink it, but it came back, his head fell forward and he passed away, and never moved again."

Dr. Fraser, of Perth, Ont., has also written an interesting account of the patient's last illness which practically corresponds with the above description.

I happened to be in Montreal the day on which Dr. L. received word of his brother's death, and as I had seen the case on several occasions with Dr. Buller, I gladly consented to go to Perth with Drs. Buller and Wyatt Johnston to make an examination.

Autopsy, twenty hours after death. Body well nourished. Face and general surface blanched, rigor mortis present, *calvaria* of normal thickness. *Dura mater* not very adherent. Sinuses contain fluid blood. Surface of brain as examined *in situ*, symmetrical, but rather wide in parietal regions. A large quantity of clear fluid escaped in removal of the organ. A few adhesions of the pia mater and brain substance to the dura covering the middle fossæ so that the brain substance here tore in lifting out the temporo-sphenoidal lobes. No adhesions at the base, but the infundibulum was greatly thickened, and cut with resistance at its point of junction with the pituitary body.

Parts of the base present the following appearance: Olfactory bulbs look small and the nerves seem a little flattened, particularly the posterior third. A cystic tumor, the size of a walnut, occupies the space between the corpora albicantia and the commencement of the longitudinal fissure. It measured about three by three centimetres, and consisted of two parts, an anterior cyst, somewhat translucent, and a posterior firmer, cone-shaped portion which represents the infundibulum and was attached to the pituitary body by a stalk five millimetres in thickness. The mass occupies the position of the chiasma, no trace of which can be seen. The optic nerves are atrophied, only two millimetres in diameter, gray in color, and were at-

tached to the antero-external angles of the cystic tumor. The optic tracts pass off from the postero-external portion and as far as the anterior fibres of the crura are distinct, but from this point they are represented by a thin, pale, gray bands, scarcely discernible. In front the tumor presents a rounded smooth surface, which rests upon the longitudinal fissure, and the hinder part of the first frontal convolutions. Laterally it does not extend upon the anterior perforated spaces. Posteriorly it reaches the corpora albicantia, but does not involve them. The crura form part of its posterior boundary, and they look as if slightly spread by it. The pia mater covers the mass, but is not specially adherent or thickened. The vessels of the circle are a little displaced, but are otherwise normal. The nerves at the base appear healthy; the left third nerve looks a little translucent at one spot.

The convolutions are slightly flattened, and the vessels of the pia not unusually full. On section the substance cut with firmness. Centrum ovale looks natural, puncta vasculosa numerous. Corpus callosum normal. Lateral ventricles are considerably dilated, and contain an excess of fluid. The posterior cornua seem particularly large. The veins along the surface are full. Fornix and septum are flattened, but can be lifted readily. Velum interpositum very vascular, and the venæ Galeni full. The third ventricle presents the following condition: Pineal gland, with its peduncles, and the posterior commissure look normal. The middle commissure is large and distinct. A firm mass occupies the anterior and lower part of the ventricle between the pillars of the fornix. It is about 2.5 centimetres in length by 1.5 in breadth. Behind it is in contact with the thalami, and on the right side with the smooth surface of the caudate nucleus. The right pillar of the fornix is distinct, the left appears to be involved, and the mass is of greater extent towards this side where it is firmly connected with the caudate nucleus. It is solid in the greater part of its extent, but centrally there is a cyst with clear fluid. Whether this

originally communicated directly with the third ventricle could not be determined, but at the upper part the wall is very thin and translucent. The cyst is directly continuous with the one at the base of the brain.

The corpora striata and optic thalami appear normal.

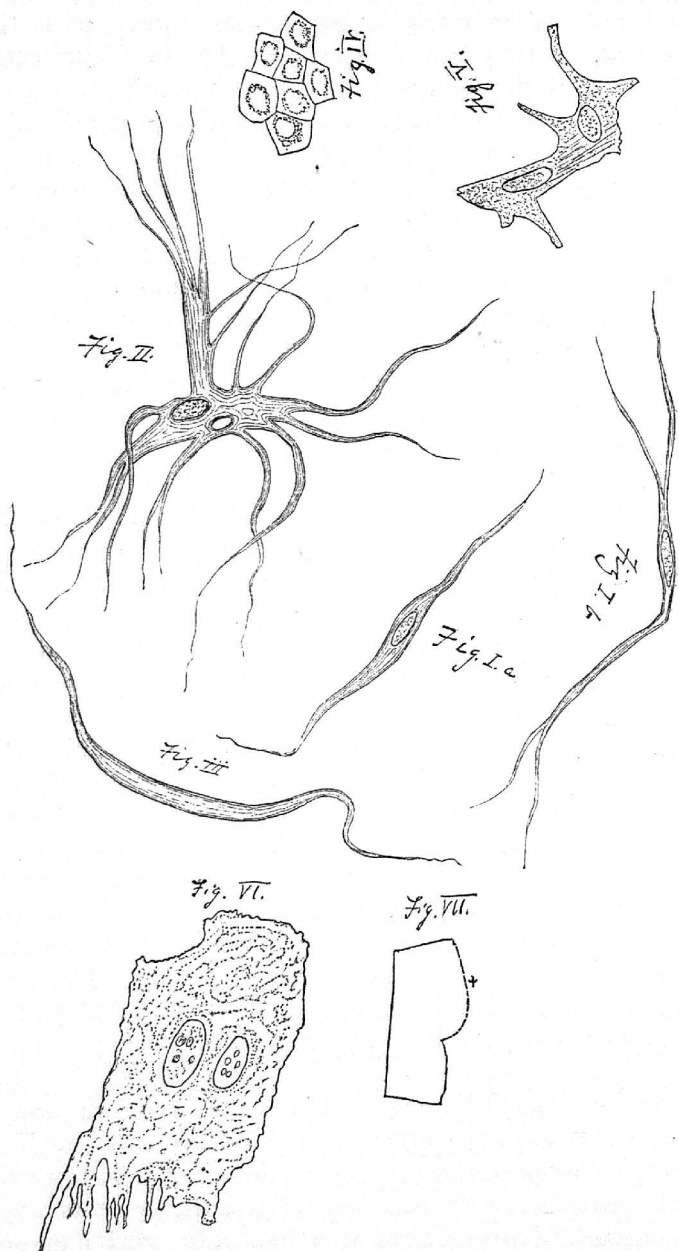
The tumor then occupied the anterior extremity of the third ventricle, partially involving the left pillar of the fornix, but not extending laterally into the ganglia. At the base, it involved the parts known as the tuber cinereum, the lamina cinerea, and the infundibulum, destroying completely the chiasma and producing wasting of the optic nerves and tracts.

The infundibulum forms a firm conical mass attached to the hinder part of the tumor, and tapers to a diameter of five millimetres at its insertion into the pituitary body.

The tumor consists of a cyst with solid walls of variable thickness and clear contents. Whether it communicated with the third ventricle was unfortunately not accurately noted, probably it did not. The lining membrane of the cyst is smooth and glistening like that of a ventricle, and here and there in the surface are small yellow granules.

At the base, anterior to the thickened infundibulum, the walls are very thin and translucent, but laterally and behind they form a firm, solid mass of a grayish color and present a rough, uneven surface. The portion in the third ventricle has thicker walls in proportion to the cyst, and the tissue has a grayish translucent aspect. Through the wall in places, particularly where thin, a yellow color is noticeable, not uniform, but in small areas. The tissue of the infundibulum is solid, gray externally, but yellowish-brown in the inside and on section it cuts with a gritty sensation.

Pons normal. Fourth ventricle and corpora quadrigemina present nothing special. The *iter* not much dilated. The posterior aspect of the cord, about twelve millimetres below the calamus scriptorius, presents a very remarkable depression, as if a fine tight cord had been



passed round in an oblique direction, extending from a point just above the line of emergence of the anterior roots of the first cervical nerve. The part above the constriction projects seven millimetres beyond the level of the rest of the cervical cord. The pia mater dips into the depression, and the outlines of the funiculi graciles and restiform bodies are quite distinct to its margins. There is no softening, no hyperæmia, no alteration in color, and it looks like an anomaly rather than a pathological condition. Fig. 7 shows a facsimile outline sketch after section in the groove between the restiform bodies and the posterior column on the right side.

Histological examination.—The tumor consisted chiefly of: (1) a matrix of densely interwoven fine fibres without definite arrangement. In the infundibulum and on the wall of the cyst they were more closely set than in the softer mass within the third ventricle.

(2) Spindle and branched cells which were found in all parts, but more particularly in the softer portions by the base of the cyst and in the ventricle. From the latter situation, teased bits showed very remarkable forms; many were fusiform, greatly elongated and with the extremities prolonged into delicate filaments (Fig. 1, *a* and *b*). Some of the branched forms were the largest and most beautiful structures of the kind which I have ever met with in either normal or pathological growths. Fig. 2 represents one of these large "spider" cells outlined with the camera. Many of the processes were prolonged far beyond the margins of the field. The protoplasm was as a rule delicate, with but few granules. Here and there were noted curious elongated non-nucleated cells with a hyaline, homogeneous stroma (Fig. 3). I have described these as occurring in a case of medullary neuroma of the brain,¹ and have since met with them in several gliomas.² They probably result from the transformation of the ordinary spindle cell, many of which are identical in form.

¹ Journal of Anatomy and Physiology, London, vol. xv.

² Medical News, Phila., 1886.

(3) A beautiful pavement epithelium (Fig. 4) lined the cyst; the cells were not extremely flattened, and in many places were filled with granules.

(4) Pearly bodies which were attached on the inner wall of the cyst, and were also very abundant in the thickened infundibulum. These consisted of nests of epithelial cells, and as many of them were calcified, section with the knife gave a gritty sensation. The concentric arrangement was well seen in the smaller nests, but not in the larger ones, which were too deeply impregnated with lime salts. The epithelial elements were very numerous in the thickened infundibulum, and all shapes and sizes occurred in teased preparations. Many were much flattened and curved; others of irregular and bizarre form (Fig. 5). Some of these were of comparatively enormous size and very flat (Fig. 6). It was difficult at first to believe that we were dealing with epithelial cells. It is interesting to note that there were no cholesterin crystals. The remarkable indentation in the posterior aspect of the upper part of the cord; an outline of which is given at Fig. 7, showed in section a normal white matter at the base of the groove without a trace of induration or increase in the fibrous elements.

Remarks.—Indications of brain trouble existed in this case for at least ten years, and possibly the headaches which occurred when a lad may have been due to the growth in the third ventricle either beginning or assuming a more active condition. During the year 1879 and the first six months of 1880, the growth extended to the base of the brain, and produced at first neuritis and finally atrophy of the optic nerves. This was due to the gradual formation of the cyst which occupied the position of the chiasma. At this time, too, the headache was most intense, the signs of irritation (convulsions, paræsthesia, vomiting, staggering gait) most marked. Recurring attacks of somnolence occur with great frequency in brain tumor—particularly in syphiloma, but I do not think we have yet reached a satisfactory explanation of their variability. We may reasonably assume that from July, 1880,

to June, 1885, the brain accommodated itself to the increased pressure, and that during this time the growth remained stationary. The return of the symptoms in 1885 may have been connected with the development of the hydrocephalus due to pressure of the tumor on the veins. A portion of the mass in the third ventricle looked recent, and certainly contained less of the dense fibrillar connective tissue than in other parts, indicating possibly a more recent formation. I thought at first that the constricted furrow on the upper portion of the cervical cord might be due to pressure, and in this way might perhaps explain some of the symptoms of tingling, etc., of which he complained; but the situation and character of the groove and the absence of the slightest induration are very much opposed to such a view.

The tumeur perlée of Cruveilhier, or cholesteatoma of Johannes Müller, is a very rare growth, most often met with at the base of the brain. It is in reality an endothelioma, and in this instance probably began in the cellular lining of the third ventricle, and its extension in the infundibulum.

EXPLANATION OF THE FIGURES.

FIG. 1, *a* and *b*.—Spindle cells from the mass in third ventricle.

FIG. 2.—Enormous "spider" cell from the same situation. Nos. 7 and 3.

FIG. 3.—Non-nucleated, translucent fibre cell.

FIG. 4.—Endothelial lining of the cyst wall.

FIG. 5.—Irregular form of endothelium obtained by teasing a small piece of the central part of infundibulum.

FIG. 6.—Enormous flat endothelial scale. Nos. 9 and 3.

FIG. 7.—Outline of medulla and cord showing the furrow in the posterior surface; + indicates the calamus scriptorius.